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PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventor: ROLAND JAMES PARKER

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COMPLETE SPECIFICATION

Paddle Mixer

We, FREDERICK PARKER LIMITED, a British Company, of Viaduct Works, Catherine Street (Extension), Leicester do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The subject of the present invention is an improved form of paddle mixer for the mixing of concrete or other aggregate materials, devised with the object of obtaining an efficient and thorough mixing of the material, allied with an economic power consumption and ready discharge of the mixed material.

In particular the invention is concerned with a paddle mixer of the type comprising a trough with a horizontal rotary shaft mounted therein and extending along the length thereof, this shaft having a plurality of arms extending radially therefrom and spaced along its length, each arm carrying a paddle blade. Paddle mixers of this character will hereinafter be identified as "of the type referred to".

Generally stated, in the paddle mixer of the type referred to according to this invention at least some of the paddle blades are each arranged so that the effective material-impelling face thereof is tilted relatively to the radial plane containing the axis of the rotary shaft and the axis of its arm, about a line disposed in said radial plane and perpendicular with respect to the axis of the arm, the direction of this tilt being such that, in operation, the paddle blades impel the material being mixed in the trough outwards from the confines of the blades.

By virtue of this manner of impulsion of the material the trough (which will conveniently be of U-shape in vertical cross section) can be provided with a discharge door at the upper part of one of the side walls in the range of the paddle blades with the inclined material-impelling faces so that, with this door open, the said blades will throw the material upwards and out through the door opening. This facility is extremely valuable in raising the effective loading height for a receiver, such as a hopper or truck, disposed alongside the trough.

Advantageously, the paddle blades are spaced along the rotary shaft in two groups which are disposed one on each side of a central plane perpendicular to the axis of the shaft, the arms of the blades in each group being angularly offset relatively to each other around the axis of the shaft, and the blades also being set at angles to the rotary planes of the respective arms, which angles decrease successively outwards from the centre of the trough, whereby the paddle faces of each group, in effect, form parts of a helix with the two helices of the two groups directed oppositely to one another and towards the centre of the trough. Thus, the blades apply a "screwing" action to the material from each end of the trough to promote the thoroughness of mixing. By the term "rotary plane" we refer above, and hereafter in this specification to the plane transcribed by the axis of the paddle arm concerned as it turns with the rotary shaft.

Moreover, the individual arms of the paddles of each group are preferably relatively angularly offset in a regular sequence which is the same in both groups, but the corresponding arms in the two groups, numbering outwards from the aforesaid central plane, are rotationally offset one from the other. This means, in effect, that the "starts" of the two groups of helices are rotationally offset; to preserve balance, they are best offset at 180°. As a consequence of this arrangement, the material is not only screwed towards

the centre of the trough but is also positively moved backwards and forwards along the trough and actively churned and kneaded.

A form of paddle mixer constructed in accordance with the present invention is illustrated, by way of example, in the accompanying drawings, in which:—

Figure 1 is a perspective view, partly cut away, of the paddle mixer of this example, and

Figure 2 is a perspective view, partly in section, of one of the paddle blades and its arm.

Referring to Figure 1, the paddle mixer has a trough 1 of U cross-section with an open top and with end walls 2. One side of the trough 1 is cut away at 6 to assist loading in of the aggregate material or of the components to be mixed, whilst the other side wall is provided with an aperture 7 approximately midway up its height to provide a discharge opening at a relatively high level. During normal mixing this will be closed by a door (not shown).

A horizontal rotary shaft 3 runs along the length of the trough and is supported in plummer blocks 4 on the end walls 2, these blocks each containing a set of self-aligning roller bearings. At one end, e.g. at 5 the shaft extends beyond the trough to be coupled to an appropriate drive means (not shown).

Within the trough the shaft carries six paddles approximately equally spaced along the length of the shaft and each consisting basically of a robust steel arm 8 of rod form extending radially from the shaft and carrying at its outer end a blade in the form of a support 9 carrying a wear-plate 10 of the same outline shape. Each blade 9, 10 is overall of substantially rectangular shape with its longer edges of shallow curvature.

The paddles may be regarded as arranged in two groups of three paddles each, one such group being disposed at each side of a central plane of the trough perpendicular to the axis of the shaft 3. The paddles of the lefthand group, in Figure 1, have been designated 11^1, 11^2 and 11^3, and the righthand group is 12^1, 12^2, 12^3, the group being numbered, in each case, in order from the central plane of the trough outwards. Each of the blades 9, 10 is tilted, relatively to the radial plane containing the axis of the rotary shaft 5 and the axis of the arm of the paddle concerned, about a line perpendicular with respect to the axis of the arm to produce the outwards impulsion of the material forwarded by this arm in the sense indicated in the preamble of this specification. This tilting is most clearly indicated in Figure 2 of the drawings which takes the example of the paddle arm 12^1 and indicates the axis X—X of the shaft 3, the axis Y—Y of the arm 8 concerned, and the line Z—Z about which the blade is regarded as being tilted in the sense described above. As will be observed from the drawing, this line Z—Z lies in the plane defined by the axes X—X and Y—Y and is at right angles to the arm axis Y—Y. Figure 2 further indicates at W—W the medial line of the rear face of the blade 9, 10 taken in the vertical plane through the axis Y—Y, and it will be observed that the angle between Y—Y and W—W is approximately 15°.

Although, in the instance illustrated in the drawing, it is assumed that all the paddle blades in the trough are given this tilt, it will be appreciated that this disposition of the blade, to produce the outwards impulsion of the material being processed, is not so important to the two end paddles because they are not directly concerned with ejecting material from the opening 6 of the aperture 7, and for this reason the blades of 11^3 and 12^3 need not be tilted in the manner indicated.

In addition to the tilt described, the paddle blades are also set at angles to the rotary planes of their respective arms, i.e. their faces are always canted out of the plane transcribed by the respective arm 12 as it turns within the trough.

Moreover it is to be appreciated that the angles at which the blades are set in this way vary from one paddle to the next, the angle decreasing successively outwards from the centre of the trough in the case of the blades of each group 11 and 12. Thus, for instance, the blade of 11^1 is at an angle of about 70° to its rotary plane, the blade of 11^2 is at an angle of about 55° to its rotary plane, and the outer paddle 11^3 is at an angle of 30° to the related rotary plane. The blades of paddles 12^1, 12^2 and 12^3 are similarly angled but in the opposite sense, with the result that the two groups represent oppositely acting, interrupted helices both of which act to "screw" the aggregate inwards towards the centre of the trough.

It is further to be observed that the individual arms of the paddles of each group 11 and 12 are angularly offset by 120° to one another in a regular sequence. It will further be observed that the corresponding arms in the two groups, as numbered outwards from the aforesaid central plane are rotationally offset from one another through 180°. Hence, the first arm 11^1 of group 11 is at 180° to the first arm 12^1 of group 12, 11^2 is at 180° to 12^2, and 11^3 at 180° to 12^3. The result is that, when the mixer is in action, aggregate material will not only be "screwed" towards the centre of the trough by the part helix constituted by respective paddle groups 11 and 12, but will, in fact, be urged towards one end of the trough by one group to be picked up and screwed back by the other. This produces an effective churning and homogeneous mixing of the material. It is further

to be noted that each arm 8 is dimensioned so that its blade 9, 10 will sweep close to the trough wall thus avoiding a static accumulation of material.

When in use, the mixer described is such as to impart to the material a compulsive and positive kneading and mixing which will give a completely uniform mix. It can handle a wide variety of materials with equal efficiency, including constructional concrete, lean concrete, wet mix, stabilised soil, mortar, plaster and tarmacadam.

WHAT WE CLAIM IS:—

1. A paddle mixer of the type referred to, in which at least some of the paddle blades are each arranged so that the effective material-impelling face thereof is tilted relatively to the radial plane containing the axis of the rotary shaft and the axis of its arm, about a line disposed in said radial plane and perpendicular with respect to the axis of the arm, the direction of this tilt being such that, in operation, the paddle blades impel the material being mixed in the trough outwards from the confines of the blades.

2. A paddle mixer according to Claim 1, in which the paddle blades are spaced along the rotary shaft in two groups which are disposed one on each side of a central plane perpendicular to the axis of the shaft, the arms of the blades in each group being angularly offset relatively to each other around the axis of the shaft, and the blades also being set at angles to the rotary planes of the respective arms, which angles decrease successively outwards from the centre of the trough, whereby the paddle faces of each group, in effect, form parts of a helix with the helices of the two groups directed oppositely to one another and towards the centre of the trough.

3. A paddle mixer according to Claim 2, in which the individual arms of the paddles of each group are relatively angularly offset in a regular sequence which is the same in both groups, but the corresponding arms in the two groups, numbering outwards from the aforesaid central plane, are rotationally offset one from the other.

4. A paddle mixer, substantially as herein described with reference to the accompanying drawings.

E. N. LEWIS & TAYLOR
Chartered Patent Agents,
144 New Walk,
Leicester.
Agents for the Applicants.

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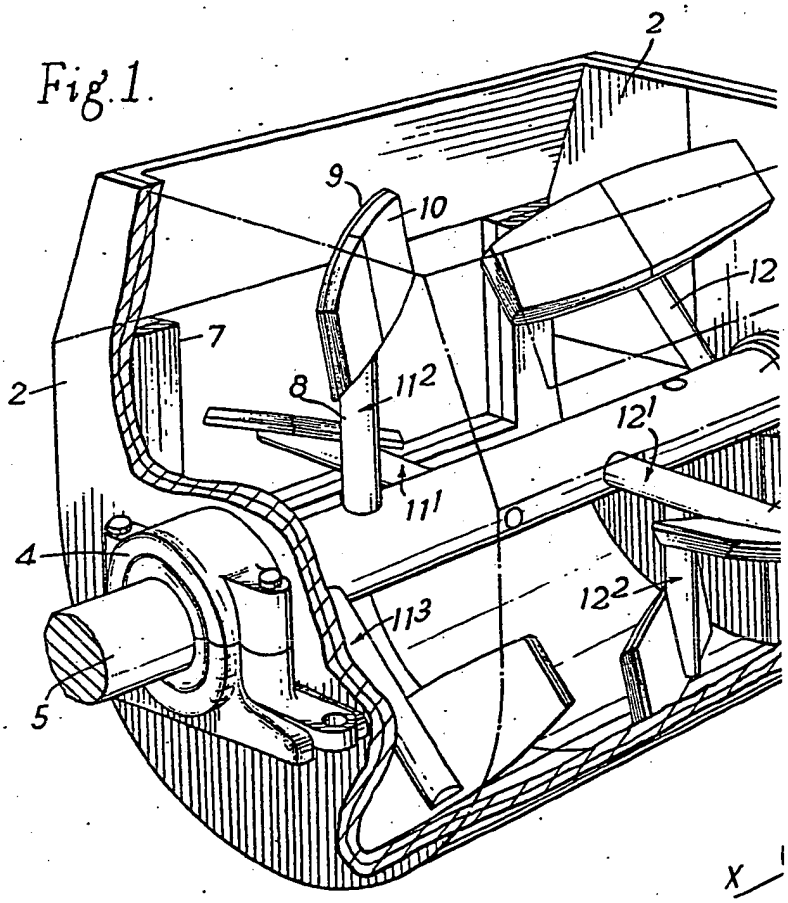
Fig.1.



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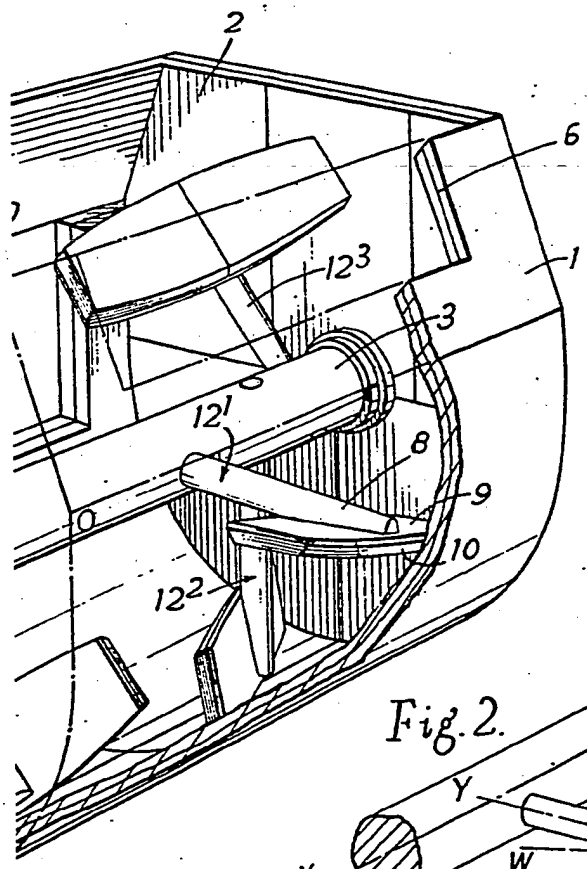

Fig. 2.

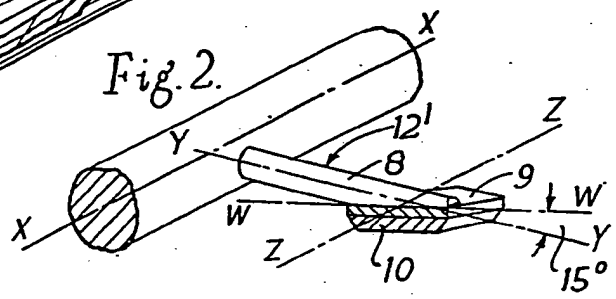

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Fig.1.

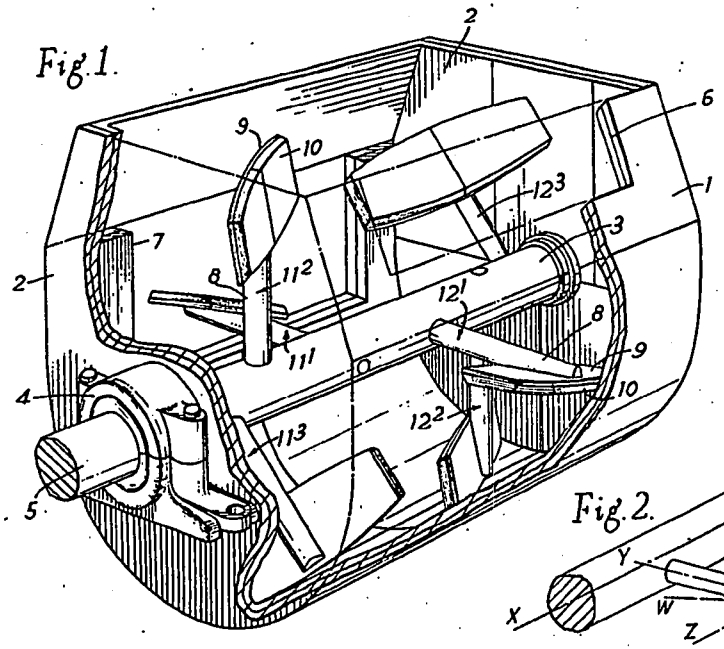

Fig.2.